FY 2001 Secretary of Defense Environmental Awards Nomination

Environmental Quality, Non-Industrial Installation

National Training Center & Fort Irwin, California

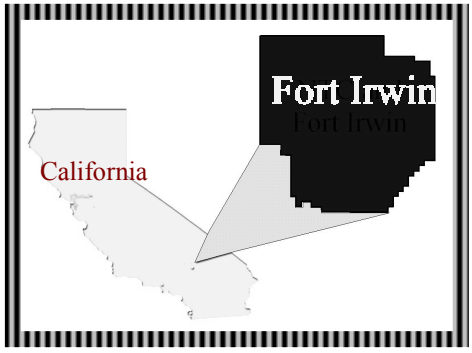
PM10 Partisol Air Sampling Site

Hazmart Hazardous Material Storage

Hazmart Hazardous Materail Control Center

Fort Irwin Recycling Center

The National Training Center and Fort Irwin, CA.



Introduction

As the U.S. Army's premier field-combat training facility, the primary mission of Fort Irwin and the National Training Center (NTC) is to provide joint and combined arms training in California's harsh Mojave Desert. Located in north-central San Bernardino County, Fort Irwin encompasses 636,182 acres (slightly over 1,000 square miles) of arid basins, dry lakebeds, ridges, and mountain ranges. Approximately half of this area is restricted from training due to various logistical, physiographic, cultural, and environmental concerns. As a result, the installation is acquiring an additional 113,000 acres of adjacent land to better simulate the changing conditions of the 21st century battlefield.

The installation challenges visiting units of 4,000 to 5,000 soldiers each month with unparalleled force-on-force and live-fire training opportunities, which consists of a ten, 28-day rotations (approximately 280 days) per year, with each rotation costing up to 10 million dollars. The training played a major role in the development of tactics and training of troops in Operation Desert Storm. Missions are supported by active duty military and working civilian populations of approximately 4,804 and 3,754.

Background

Fort Irwin has been an integral part of the Central Mojave for over 60 years, and is steeped in both tradition and honor. Initially called Camp Irwin, the facility was created by President Franklin Delano Roosevelt in 1940 and utilized as an Anti-Aircraft Range during World War II. The installation later became a combat training facility and mobilization center during the Korean War and Vietnam Conflict, and ultimately was designated as the National Training Center in 1981.

Program Summary

The Environmental Division's mission is to conserve, protect and restore our natural and cultural resources while accomplishing the military mission. Proper environmental management and coordination at the National Training Center is not only necessary to comply with Federal, state and local regulations, it also benefits the overall mission by preventing time delays or operational shutdowns and improves public relations. Our environmental management program consists of four general components:

- **Environmental Compliance** – those aspects, which affect current operations such as, air quality attainment, hazardous waste/materials management, wastewater discharge, sewage treatment and noise abatement.
- **Environmental Restoration** - those aspects that relate to remediation of contamination caused by past waste disposal practices. This remediation is performed under the Installation Restoration Program (IRP).
- **Natural and Cultural Resources Management** – those aspects that pertain to the management, conservation, and restoration of the land itself and those renewable natural resources such as deserts, wildlife as well as historical and archeological resources.

- **Pollution Prevention** – those aspects, which include eliminating pollution to the greatest extent possible. This includes reducing hazardous materials use and hazardous waste generation. Prevention is achieved by using less toxic materials or environmentally accepted operations, increasing efficiency and preventing accidents, which result in damage to the environment.

Accomplishments

Air Pollution Control

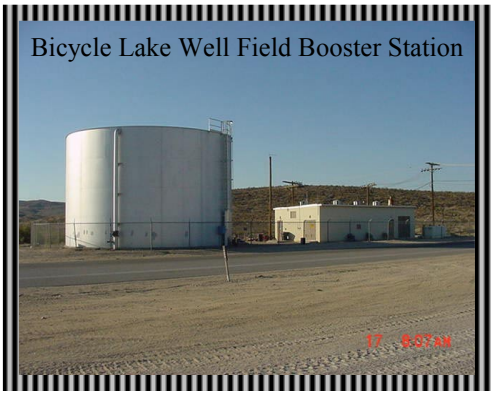

PM¹⁰ Partisol Air Sampling Machine

In 1994 Ft. Irwin recognized the significant quantity of particulate matter less than 10 microns (PM^{10}) generated during rotation exercises and started monitoring at six different locations on the EPA six-day schedule. In addition, since 1995, there has been extensive saturation sampling at four other sites for PM^{10}. A dust study, in conjunction with U.S. Army Forces Command (FORSCOM), was initiated in 1995 to develop a mechanism to mitigate this problem. This is an ongoing program to ensure the military can continue to train without restrictions, by controlling fugitive dust, preventing the exceedence of PM^{10} standards and maintaining compliance with air quality standards.

Since March 1998, Fort Irwin's air pollution mitigation methods have included extensive paving of roads, parking lots and paths, laying of aggregate rock for ground cover, and installation of solar powered street lamps in cantonment and housing areas. In addition, ITAM has completed re-vegetation by seeding and planting shrubs and grasses, treating roads with dust reducing products and enhancing soil stability with biological crusts. There are 82 permitted emission source sites issued on Fort Irwin for use of boilers, generators, spray painting equipment, storage tanks, fire pumps, and various other machinery. In 2000, the NTC successfully made a transition from the use of chlorine in wastewater treatment to sodium hypochlorite. The use of chlorine is no longer a factor in the Risk Management Plan. These measures increase the quality of life for soldiers and families by improving air quality and allow training and garrison areas to be maintained for future use.

The National Training Center's air quality improvement efforts have not gone unrecognized. The Mohave Desert Air Quality Management District has awarded the NTC the Exemplar Award for three consecutive years, from 1999 - 2001. This award is given to organizations within the district that have demonstrated exceptional commitment to clean air through the development of voluntary air pollution prevention and control efforts. Selection for this award is based on a programs ability to improve air quality quantifiably, innovation in approach, long-term benefits, sound environmental philosophy and replicability. Through partnerships with Ft. Irwin's Integrated Training Area Management (ITAM), Directorate of Public Works, Anteon Corporation, Army Corp of Engineers, Johnson Controls and Pacific Northwest National Laboratory (PNNL), substantial measures have been evaluated and implemented to decrease airborne pollution at the NTC.

Water Pollution Control



Fort Irwin is a desert community. Summertime temperatures often exceed 115 degrees Fahrenheit, relative humidity hovers around 20% for most of the year, and transpiration averages 75 inches of water annually. In this extreme environment, water is a very valuable resource. Fort Irwin's Water Program, which encompasses the production of fresh water from wells, purification and supply of drinking water (RO water) along with "domestic" water in a dual water system, collection and treatment of 1.2 million gallons a day of municipal wastewater, and conservation, pollution prevention and monitoring efforts, seeks to protect and conserve this precious commodity to ensure clean water for the NTC mission and the Irwin community into the next century.

Drinking water on Fort Irwin must be treated by reverse osmosis filtration due to high fluoride levels. Modifications undertaken in 1998 changed the type of membrane used in the process. This simple change allowed Fort Irwin to eliminate storage of 500 gallons, or 100%, of sulfuric acid from a housing area, and saves approximately *166,000 kilowatt-hours* of electricity and almost *33 million gallons* of water annually, equal to 3% of total production.

The wastewater is treated through a secondary extended aeration system to a level, which allows use for irrigation and dust control without human contact. Improvements during 1999 eliminated sewage spills at the plant, improved influent quantity measurement and sampling collection, and *eliminated 8,000 pounds, or 100%* of gaseous chlorine with sodium hypochlorite generators.

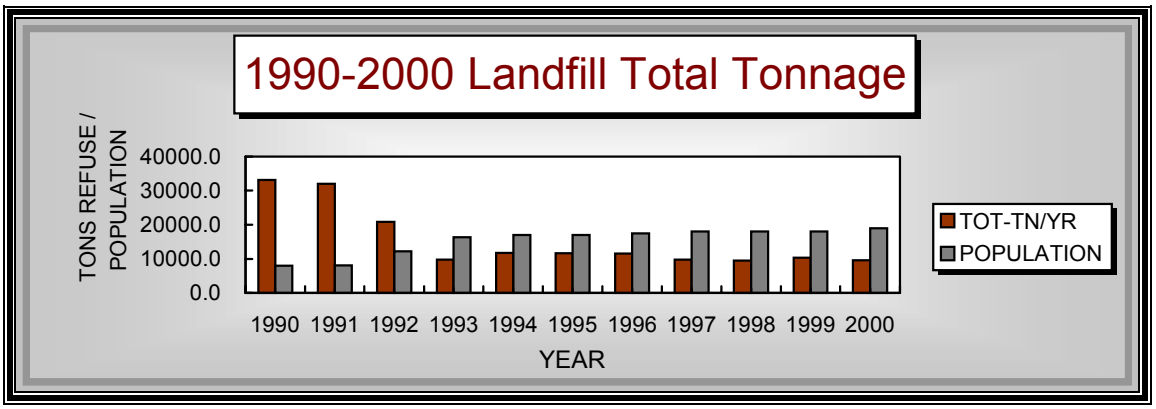
Closed Loop Wash Rack System

As many as 6,000 tactical vehicles a month are washed on Fort Irwin's wash racks. Prior to 1996, Fort Irwin's wash racks were in a general state of disrepair and consisted mainly of hoses on hose bibs draining into sludge basins, with ineffective oil skimmers. At the rate of 20 gallons per minute per hose, a rotation was using 1.5 million gallons of water for the regeneration process, in addition to this waste, the sludge basins created conditions ideal for the propagation of hydrogen sulfide generating bacteria. In 1995, more than 70 contract workers lost time due to reported exposure to hydrogen sulfide. In 1996, an extensive repair and refurbishment project was undertaken to modify the wash racks. The systems now utilize advanced oil water separators, backwashing sand filters, bag filters, and ozone generators to filter, purify and recycle all wash water through a closed loop wash rack system. During FY00, Fort Irwin built a new state-of-the-art 26-bay closed loop wash rack system. Rotational units can wash 72 vehicles at a time, thereby saving time during regeneration. Only makeup water is required. Due to these modifications, approximately *11,000,000 gallons of water, or 1% of total production, are conserved per year.*

Waste Management and Resource Recovery

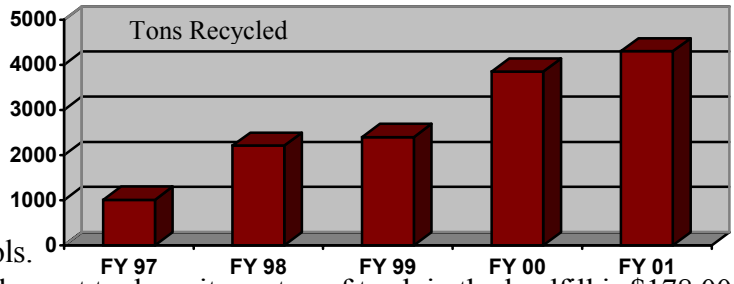
Fort Irwin is *among the first installations that have exceeded the Department of Defense goal of a 40-percent diversion of all current solid waste* generated by the year 2005. Fort Irwin as also exceeded the California requirement to reduce the 1990 baseline disposal of non-hazardous solid waste by 50 percent by the year 2000. Solid Waste is diverted from the landfill and processed

through the installation recycling center and composting facility.



Fort Irwin Recycling

Fort Irwin has a state of the art commingled recycling program. Blue containers are provided to the housing occupants and in the offices to deposit all recyclables. They are being sorted at the recycling center. This has resulted in an increase of more than 400% for material being recycled from 1997 - 2001.



- Fort Irwin recycling management continuously provides training to enhance public awareness of recycling procedures. Articles are published in the post newspaper. Fort Irwin celebrates Earth Day and America Recycles Day with the elementary schools.
- Fort Irwin is a remote installation. The cost to deposit one ton of trash in the landfill is $178.00. The cost to recycle one ton of trash is $78.00.
- In addition to the sales, the overall cost savings from the recycling program includes the cost avoidance of reduced landfill operation, which was *$384,694* in Fiscal year 2000 and to *$430,000* for FY 2001.
- Fort Irwin recycles the following classes of materials: paper (writing paper, newspaper, computer printouts, and cardboard), cans (aluminum and steel), plastics (milk jugs, soda bottles, detergent bottles), glass (clear, amber, and green glass), concertina wire, heavy grade plastics, toner cartridges, antifreeze, and used motor oil.

Compost Facility

The Fort Irwin Compost Program spans three areas of environmental concern, those being the areas of solid wastes, air quality, and water conservation. As the National Training Center, Fort Irwin produces around 20,000 cubic yards of wood waste a year in the form of pallets, ammo boxes, and target scrap. In the past, this wood was periodically burned, generating smoke for months. In addition, the Fort Irwin community produces about 10,000 cubic yards of green waste annually, which in the past had been stockpiled at an

unauthorized dumpsite on post. The wastewater treatment plant produces about 900 tons of Class A sewer sludge annually, which was disposed of in the landfill at a cost of $178 a ton. The desire to dispose of these waste streams in an environmentally friendly manner led to the inception of the Compost Facility. Currently operating under a pilot program, the facility is using an in-vessel technology known as the Ag-Bag system, which places the composting material inside a 500-foot long, 10-foot diameter plastic bag into which air is introduced to control the temperature. As the material is put in the bags wet and the moisture is held in for the duration of the processing, water resources are conserved. During FY00 and FY01, Fort Irwin *diverted 1,800 tons of sewage sludge and 40,000 cubic yards of waste wood, or 100% of these waste streams*.

Toxic & Hazardous Waste Management

The primary source of hazardous waste at Fort Irwin comes from the operation and maintenance of military support vehicles. The hazardous substances used include POL products such as diesel fuel, motor oil, JP-8, used oil, hydraulic oil, anti-freeze, degreasing solvents, and battery acid. Contaminated soils are generated primarily from field exercises where JP-8 and other POL spills may occur. Fort Irwin produces approximately 4200 tons of POL contaminated soils per year. Additionally waste is also generated from the routine servicing of the installation's wash racks.

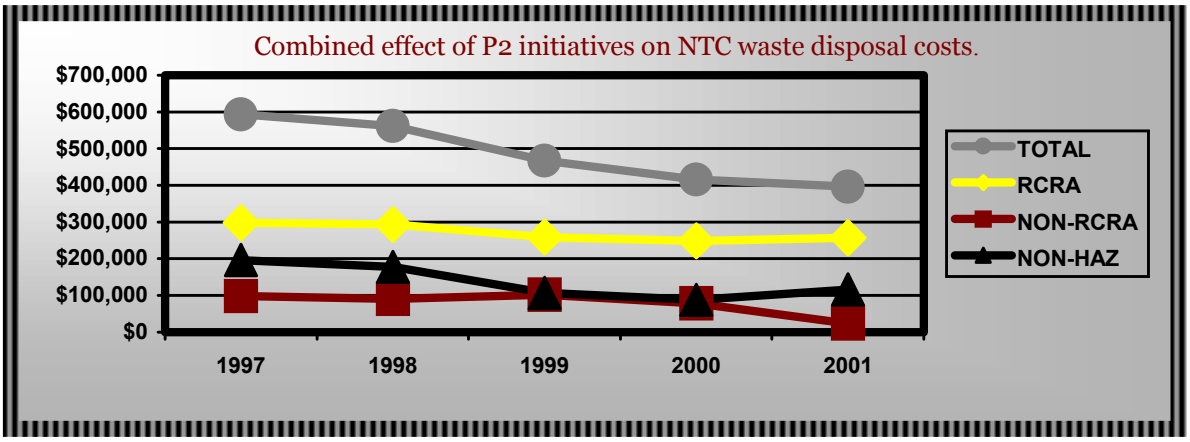
Hazardous Waste Accumulation, Handling, and Disposal

Hazardous waste is generated/accumulated at approximately 70 sites on Fort Irwin. The Hazardous Waste Service Contractor collects the waste from the sites approximately every 45 days and transfers it to one of two consolidation points, Building 630 or Building 703. In 1999, Fort Irwin applied for and received a waiver to circumvent DRMO and independently arrange for the disposal of installation-generated hazardous waste.

All 70 of the accumulation sites are monitored for regulatory compliance through continuous inspections. These inspections are executed on a daily, weekly, monthly and quarterly basis and are conducted by the Hazardous Waste/Material Handler and/or Hazardous Waste/Material Manager assigned at the unit level. These inspections have helped Fort Irwin to stay in compliance. Fort Irwin boasts a perfect track record of *zero notices of violation* (NOVs) issued for five consecutive years. During this period Fort Irwin had numerous regulatory inspections, including a multimedia inspection from the EPA region-IX.

Hazardous Waste Minimization

The NTC and Fort Irwin are proactively reducing hazardous waste costs by implementing a comprehensive integrated approach to managing the generation and disposal of waste. Under this approach pollution prevention measures has been incorporated into daily activities at several levels across a broad range of multi-functional users. The result of this cradle-to-grave management philosophy at the NTC is a substantial annual cost savings of approximately *$2,000,000* to the installation. This has improved mission readiness and soldier quality of life without compromising environmental concerns. The following chart marks a 30% reduction in disposal costs from 1997-2001.



Environmental Education

The NTC and Fort Irwin has established a Hazardous Materials/Waste Handler's Training Program. This program is required for all unit Environmental Awareness Officers, Hazardous Materials/Waste Managers, Hazardous Materials/Waste Handlers and their alternates. The training consists of an initial forty-hour (40) course, with an eight (8) hour annual refresher class. During the past year, over 300 soldiers and civilian contractors have been trained. This course has been approved by the Barstow Community College and personnel satisfactorily completing it are eligible to receive two (2) and one half (1/2) college credits. Another training program has been established for all incoming rotational environmental clean-up teams to ensure they receive hazardous materials/waste spill response training required by the State of California. A total of 220 rotational unit soldiers received this training this year. During the last two years the NTC has undertaken the export of our rotational training program to Army National Guard Units. An instructor for the program travels to the State Headquarters for the guard unit and trains their environmental clean-up personnel in spill response on a drill weekend, six months prior to their rotation. This ensures they have time to train as a unit for spill response prior to deployment to the NTC. A total of 160 guardsmen have been trained since the program has been in effect. This has resulted in the two National Guard units having the *lowest dollar and tonnage totals* for contaminated soil of any rotation to the National Training Center.

Fort Irwin has developed a community education and public awareness program. We have established an educational display and public educational brochures such as soldier pocket books, brochures on endangered species, air quality, cultural resources and native wildlife.

Hazardous Material Control Center (HMCC or "HAZMART")

The HAZMART operation is an effective tool to reduce waste generation and improve compliance. The program centralizes the purchase, storage, distribution and management of hazardous material. Since implementation of the HAZMART program, the volume of hazardous materials stored at individual shops has been greatly reduced and material turn-in/re-use options became available. The table summarizes the savings in terms of the value of free issue items utilized by the NTC and rotation.

UNITS	FY00	FY01	Totals
Rotations	$135,474	$162,895	$298,369
Fort Irwin	$90,611	$87,863	$178,474
Total Cost Savings = $476,843.00			

Anti-freeze Recycling

Fort Irwin initiated an anti-freeze recycling program in 1997. The table below summarizes the cost savings achieved through this program.

Fiscal Year	Recycle Cost/gal	Recycle Cost-Total	Virgin Cost-Total	Disposal Cost-Total	Gallons Recycled	Total Savings
1997	$2.62	$31,125.60	$59,400.00	$13,305.60	11,880	$41,580.00
1998	$2.80	$28,028.00	$50,050.00	$11,211.20	10,010	$33,233.20
1999	$2.99	$41,907.84	$70,080.00	$15,697.92	14,016	$43,870.08
2000	$3.20	$81,200.00	$126,875.00	$28,420.00	25,375	$74,095.00
2001	$4.00	$54,600.00	$68,250.00	$15,288.00	13,650	$28,938.00
TOTAL SAVINGS = $221,716.28						

Re-Refined Oil

In September of FY00 Fort Irwin implemented the DLA Closed Loop Re-refined Oil Program (CLROP). Used oil is consolidated by the installation Hazardous Waste Service Contractor and is then picked up by the DLA contractor for re-refining at no cost. The re-refined oil is then purchased from the DLA contractor, through the Hazmart, in bulk and pre-packaged containers. Hazmart personnel re-package the bulk material into customer requested quantities to facilitate standard operations. The program is saving approximately $50,000 a year through the reduction of used oil disposal and the reduced price of purchasing re-refined products.

Fiscal Year	Qty. Waste Oil Disposed of through CLROP - No cost	Former Disposal Cost through DRMO - $.87 gal
FY 2000	13,481 gallons	$11,728.47
FY 2001	88,136 gallons	$76,678.32
Total CLROP Disposal Cost Savings = $88,405.92		

Propane Gas Recovery

The rotational units at NTC generate large quantities of partially used propane cylinders used for heating and cooking operations. These propane cylinders were accumulated at the end of every rotation for disposal as hazardous waste. Disposal costs through DRMO average $123.00 per cylinder. In 1996, Fort Irwin partnered with the Installation's Hazardous Waste Service Contractor (HAZCO) and developed a closed-loop system that evacuates and recovers the remaining propane from the cylinder. The recovered gas is then reintroduced as a usable product after repackaging in refillable containers. The valve stems are pulled from the empty cylinders and they are recycled as scrap metal. The total cost for this action is $1.97 per cylinder. As of August 2000, Fort Irwin has processed 53,266 propane cylinders at the cost of $1.97 per cylinder instead of DRMO's $123.00 per cylinder. The cost savings from October 1997 to August 2001 is approximately $7 million. A total of 600 gallons of propane has been recovered and reused. A total of 57 tons of metal has been recycled.

Fiscal Year	2000	2001	TOTALS
Number of Cylinders	5,051	3,946	8,997
Pounds	9,311	7,463	16,774
NTC Cost	$9,950.47	$7,773.62	$17,724.09
DRMO Cost	$621,273.00	$485,358	$1,106,631
Savings	**$611,322.53**	**$477,584.38**	**$1,088,906.91**

POL Contaminated Soil Recycling and Land Farm Operations

NTC has ten rotations a year and generates over 4200 tons of contaminated soil (CS) from the POL spills caused by training vehicle maneuver accidents. Before 1996, NTC was disposing of the CS off post at $0.09 per pound. Fort Irwin also has 150,000 tons of CS stock piled as a result of regulatory changes that altered past disposal practices.

In 1996, Fort Irwin initiated a two-part solution to resolve the situation. A POL Bioremediation land farm was constructed to treat CS from generated from current and future fuel spills. Bioremediation at our land farm costs $0.06 per pound and the treated soil is used as alternate daily cover in our landfill. The following chart summarizes the savings Fort Irwin has achieved through land farming.

Options	1999	2000	2001
Cost of Disposal Through DRMO	$795,960.00	$756,360.00	$740,160.00
Cost of Land Farming	$530,640.00	$504,240.00	$266,720.00
Savings	$265,320.00	$252,120.00	$246,720.00
Total Savings = $762,160.00			

Secondly, in cooperation with Cunningham Davis Corporation (CDC), Fort Irwin has developed a process of incorporating the CS in a cold- mix asphalt process. The product is then used to pave roads, maintenance areas and, parking lots. This process encapsulates the POL contaminates in the CS. To date, Fort Irwin has depleted 19,035.1 tons of existing CS. This process *saves 40% of the cost* of disposal of CS plus paving with new asphalt and provides a usable product.

Environmental Compliance Assessment and Management Program

The National Training Center participated in an Environmental Compliance System (ECAS) assessment in March 1999, massing a total of 140 findings with 9 positive. Issues consist of Positive, Management Practices, Health and Safety, Pollution Prevention and Risk Reduction findings. No findings with immediate danger to the environment were found. Of the 140 findings, 127 have been closed. Although the 140 findings were estimated to cost over 9 million dollars to correct, pro-active measures by the Fort Irwin Environmental Division and FORSCOM funding, we have been able to close all except 13 findings.

Fort Irwin's Environmental Division maintains a pro-active approach to environmental

compliance. This is evident by no NOV's, fines or other regulatory action against the installation since 1997.

National Environmental Policy Act (NEPA)

The NTC complies with all NEPA requirements. We have completed Environmental Assessments for our INRMP and ICRMP, as well as many Records of Environmental Consideration for many smaller projects on the installation. We are in the process of writing our Environmental Impact Statement (EIS) for our current operations, as well as the EIS for our proposed land expansion. We emphasize the need for early involvement in the planning process at our Environmental Quality Control Council meetings.

Conclusion

Fort Irwin has consistently set goals beyond the minimum, and continues to raise its performance levels. Fundamental milestones, such as exceeding the DOD 40% solid waste reduction goal, meeting the FORSCOM zero-defect policy for NOVs during the past five years, realizing a 30% reduction in hazardous waste disposal costs, achieving water use savings of 44 million gallons per year and energy use savings of 166,000 kwh per year have been attained. Through the development and implementation of innovative management and educational programs, Fort Irwin demonstrates true commitment to continual improvement in environmental quality. The below chart summarizes Fort Irwin's accomplishments.

Program	Annual Cost Avoidance	Performance Metric
Water Pollution Control		Change in reverse osmosis filtration membrane resulted in 500 gal of sulfuric acid eliminated; 166K kwh saved; and 33M gal H20 saved annually
Closed Loop Wash Rack		6000 tactical vehicles per month; new 26 bay wash rack saves 11M gal H2O annually
Recycling	**$407,347**	400% increase for recycling in 5 years or an average of 80% per year over the baseline in FY 1997
Compost Facility		20K cubic yards wood waste annually; 10K cubic yards green waste annually; 900 tons class A sludge; Diversion of 2000 tons sewage sludge and 40K cubic yards waste wood in FY 00-01
Toxic and Hazardous Waste Management - Contaminated Soil	**$254,053**	4200 tons contaminated soil (CS) produced/bio-remediated per year …19 tons of CS depleted (recycled) to date; saves 40% of disposal cost
Hazardous Waste Accumulation, Handling, and Disposal		No Notices of Violation (NOV) in 5 years well ahead of the FORSCOM Zero NOV goal by FY 2005
Hazardous Waste Minimization	**$2,000,000**	30% reduction in disposal costs over 5 years
HAZMART	**$238,420**	HW solvent waste stream reduced 99% since 1992 baseline year (from 143 tons to less than 1 ton)
Anti-freeze recycling	**$44,340**	Average annual recycling of 15K gallons of anti-freeze
Re-refined Oil	**$44,200**	50,808 gallons (average gal. Per year for FY 00 and 01) disposed through closed loop re-refined oil program
Environmental Education		300 people HM/WH Training program and 220 received HM/Waste Spill Response training

Total annual cost avoidance = $2,988,360